REMARKS

The Office has maintained the 35 U.S.C. § 103(a) rejection of claims 1-16 over Iwamoto et al. (US Publication 2002/0039677 A1) (hereinafter: "Iwamoto") that was made in the first Action dated May 3, 2006. The Office's positions are: (1) Iwamoto discloses a nonaqueous electrolyte secondary battery which can include a polyethylene separator, an electrolytic solution which can comprise ethylene carbonate and a γ-butyrolactone as solvents and an additive which can be tetrahydrofuran carbonate; (2) tetrahydrofuran and tetrahydrofuran carbonate "share close structural similarities between chemical compounds of homolog [sic], analogues and isomers" (Final Action, page 3, lines 12-13); and (3) it would have been obvious for a person of ordinary skill in the art to use tetrahydrofuran in place of the tetrahydrofuran carbonate additive of Iwamoto because these compounds, in view of the close structural similarities, would be expected to exhibit similar properties [in the nonaqueous electrolyte secondary battery of Iwamoto].

In the response filed August 3, 2006, to the first Action applicants argued that there are significant differences in chemical characteristics and properties between tetrahydrofuran (an

ether solvent) and a tetrahydrofuran carbonate (a carbonate solvent) and that the Office has not shown these compounds to be chemical analogues and, more particularly, has not shown that a person of ordinary skill in the art would have a reasonable expectation that these compounds would have similar properties when used in a lithium secondary battery where the separator comprises polyethylene and the electrolyte comprises a mixture of ethylene carbonate and γ-butyrolactone.

In response to this argument the Office has noted:

> "Tetrahydrofuran carbonate is an ester carbonic acid derivative of tetrahydrofuran. They are both strong Lewis bases having a similar property of donating electrons and neutralizing a Lewis acid such s [sic] hydrofluoric acids present in lithium batteries as evidence by Ishidoya et al. (US Patent 5,660,937; Column 12, Lines 35-60)."

(Final Action, page 4, lines 7-11).

CHEMICAL EQUIVALENCE DOES NOT ESTABLISH OBVIOUSNESS

The Office is relying on a mere alleged chemical equivalence of tetrahydrofuran carbonate and tetrahydrofuran to support its obviousness rejection. However, it is well-established that "[i]n order to rely on equivalence as a rationale supporting an

obviousness rejection, the equivalency must be recognized in the prior art, and cannot be based on applicant's disclosure or the mere fact that the components at issue are functional or mechanical equivalents. In re Ruff, 256 F.2d 590, 118 USPQ 340 (CCPA 1958). (see MPEP § 2144.06) (Emphasis applicants').

In the present case, the Office has not shown that the prior art establishes the equivalence of tetrahydrofuran carbonate and tetrahydrofuran as an additive which, when used in combination with a surface active agent, uniformly spreads over the surface of a negative electrode or positive electrode to inhibit evolution of gases at the electrodes as disclosed in Iwamoto (refer to paragraph [0041]). The mere fact that tetrahydrofuran carbonate and tetrahydrofuran may both be Lewis bases for neutralizing a Brønsted acid or Lewis acid (as described in Ishidoya) does not establish that these compounds would be recognized as equivalent additives in the battery of Iwamoto.

The statement in the Action that tetrahydrofuran carbonate and tetrahydrofuran are "both strong Lewis bases having a similar property of donating electrons and neutralizing a Lewis acid such s [sic] hydrofluoric acids present in lithium batteries" is irrelevant to the issue of obviousness raised by the Office. The issue raised by the Office is whether one of ordinary skill in the

art would have been motivated to substitute tetrahydrofuran for the tetrahydrofuran carbonate disclosed as an additive to be used together with a surface active agent for inhibiting evolution of gases at electrodes as disclosed in Iwamoto. The issue is not whether tetrahydrofuran carbonate and tetrahydrofuran would be expected to have a similar property of donating electrons and neutralizing a hydrofluoric acids present in a lithium battery.

For the above reasons, the Office has not supported a *prima facie* case of obviousness of the lithium secondary battery of the present invention and removal of the rejection is in order.

Moreover, applicants note that a person of ordinary skill in the art would not have reasonably expected tetrahydrofuran carbonate and tetrahydrofuran to function equivalently in the battery of Iwamoto. Tetrahydrofuran carbonate comprises two parts, i.e., a chain branch of carbonate and tetrahydrofuran. When tetrahydrofuran carbonate is separated (at location ① as shown in the attached sheet) to a chain carbonate and tetrahydrofuran, the chain carbonate maintains the same wettability as that of tetrahydrofuran carbonate, but tetrahydrofuran does not have the same wettability as the tetrahydrofuran carbonate. When a compound is formed by two compounds which have opposite characteristics, it

is difficult to expect which characteristic the final compound will possess.

C-O binding is generally easy to break whereas C-C binding is not easy to break. Tetrahydrofuran carbonate may be split at location ② or at location ③ and be a completely different compound from the chain carbonate and tetrahydrofuran.

For the above reasons, a person in the art could not have reasonably predicted that tetrahydrofuran carbonate could be replaced by tetrahydrofuran in the battery of Iwamoto.

Removal of the 35 U.S.C. 103(a) rejection of the claims is believed to be in order and is respectfully requested.

The foregoing is believed to be a complete and proper response to the Office Action dated October 19, 2007, and is believed to place this application in condition for allowance. If, however, minor issues remain that can be resolved by means of a telephone interview, the Examiner is respectfully requested to contact the undersigned attorney at the telephone number indicated below.

In the event that this paper is not considered to be timely filed, applicants hereby petition for an appropriate extension of time. The fee for any such extension may be charged to our Deposit Account No. 111833.

In the event any additional fees are required, please also charge our Deposit Account No. 111833.

Respectfully submitted,

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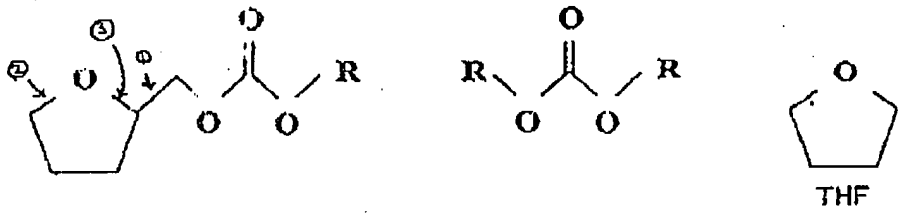
Attachment: Decomposition of tetrahydrofuran carbonate


THF